

DOCUMENT RESUME

ED 147 460

CE 012 456

TITLE North Dakota Industrial Arts. Introduction.
Curriculum Guide. Level 1.

INSTITUTION North Dakota State Board for Vocational Education,
Bismarck.

PUB DATE [77]

NOTE 23p.; For related documents see CE 012 456-460 ; Best
copy available

AVAILABLE FROM Industrial Technology Department, University of North
Dakota, Grand Forks, North Dakota 58202 (\$4.00; set
\$15.00)

EDRS PRICE MF-\$0.83 Plus Postage. HC Not Available from EDRS.

DESCRIPTORS *Career Exploration; Curriculum; *Industrial Arts;
*Industrial Education; Junior High Schools; Program
Development; Program Guides; State Curriculum Guides;
Teaching Guides

IDENTIFIERS North Dakota

ABSTRACT

This guide is designed to assist the industrial arts teacher in the development of planned programs and courses at the junior high school level that reflect the changing philosophy and practices in industrial arts education as well as incorporate the effect of technological changes. The guide, intended for use with five accompanying curriculum guides (see related note), provides the rationale and objectives of industrial arts education, program scope and sequence, format and use of the guide, and related student activities to be covered by industrial arts learning experiences (career selection, technological literacy, problem solving, skill development, consumer awareness, personal and social development, and reinforcement of learning). A one-page bibliography is appended.

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NORTH DAKOTA

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INTRODUCTION

Curriculum Guide
Level I

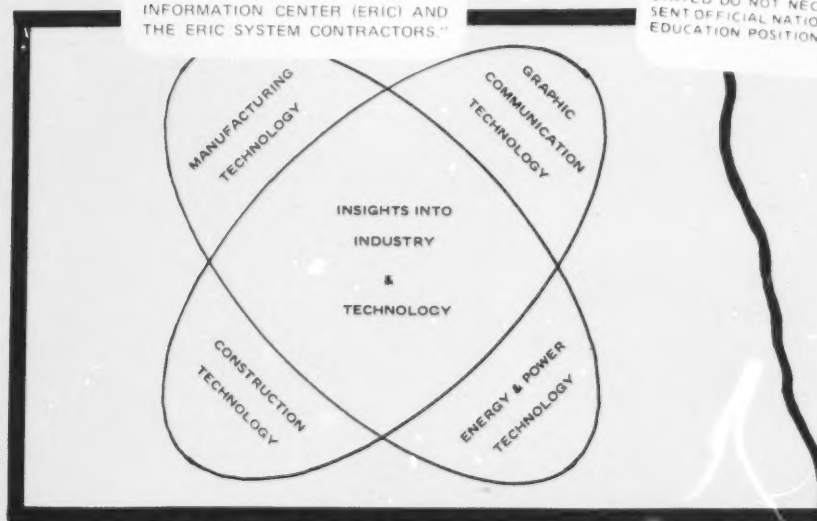
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Printed by:
Department of Industrial Technology
at the University of North Dakota
under the direction of
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FOREWORD

Concern for the curriculum of our schools promotes us all to continually seek ways to assess "what is" and identify ways to improve the educational activities and experiences now provided. Recognition of the need by many practitioners to strengthen the schools' efforts to develop the students' understanding of the technological environment prompted the development of this curriculum guide for industrial arts.

The early involvement and commitment of representatives of the North Dakota Industrial Arts Association and teacher educators in the development of this guide must be recognized as one of its major strengths. The continued involvement of those practitioners has contributed much to provide the type of information and direction that is of assistance to industrial arts teachers who are designing and implementing curricular experiences related to industry and technology.

A curriculum committee, which was composed of representatives from school divisions across the state, developed the guide over a two-year period beginning in 1975. During this time the committee obtained considerable direction from recent research findings and curriculum concepts in industrial arts from a national basis.

Designed as a directional device for the secondary school industrial arts program, the guide provides specific direction to the broad exploration, content courses in industrial arts.

The educational experiences proposed in each of the five exploratory cluster areas offer rich opportunities for students to become

acquainted with their industrial technological culture. The format and content is uniquely helpful in providing information to industrial arts teachers of the learning process as they search for ways to assure that the career development and technological literacy goals are incorporated in the educational program.

RCU PROJECT DIRECTOR
Myron Bender

"The goal of education is the continuous cultivation of the abilities to make wise decisions and execute them effectively, in all behavioral areas throughout the life of a person."

--Asahel D. Woodruff

ACKNOWLEDGEMENTS

The North Dakota Industrial Arts profession is indebted to the individuals who gave of their time and talents in development of these guides.

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RATIONALE FOR INDUSTRIAL ARTS

The case of any educational endeavor rests ultimately with the validity of certain basic assumptions. In the case of industrial arts, it is assumed that it is worthwhile for human beings to understand and be able to manage their environment.

Those elements which compose the physical environment which all human beings share can be divided into two general classes--natural and people-made. Study of the natural environment has a well-established place in the school science programs. The study of the people-made physical environment, which in the broadest sense, is a study of technology is seemingly of equal importance but its significance as total education and hence a part of the overall school curriculum has only recently begun to be understood.

Industrial arts is an organization of experiences designed to assist in the formation of concepts and development of insights into technology. These experiences are intended to have the learner participate actively in the conceiving, designing, planning and producing goods, using materials common to daily life. The learner is exposed to activities for:

- A. experiencing industrial technology
 - through planning, designing, experimenting, constructing, and operation using ideas, materials, tools, processes, products, and energies;
- B. learning about industry and technology
 - their origin, development, advance, and impact on man, environment and culture;
 - their technical, social, economic, occupational, cultural, recreational nature, influences, and outcomes;
 - their consequences for the individual as a citizen, consumer, and worker.

Clear and realistic goals are essential in providing a sound industrial arts program for all students. The unique contribution of an industrial arts program focus on providing students with an opportunity to:

1. Develop an insight and understanding of industry, its place in our society, and the free enterprise system.
2. Discover and develop individual talents, aptitudes, interests, and potentials as related to industry and technology.
3. Develop an understanding of industrial processes and the practical application of scientific principles.

5. Develop problem-solving and creative abilities involving the materials, processes, and products of industry.
6. Develop an understanding of industrial and technological career opportunities and their requirements and develop those traits which will help students obtain and maintain employment.

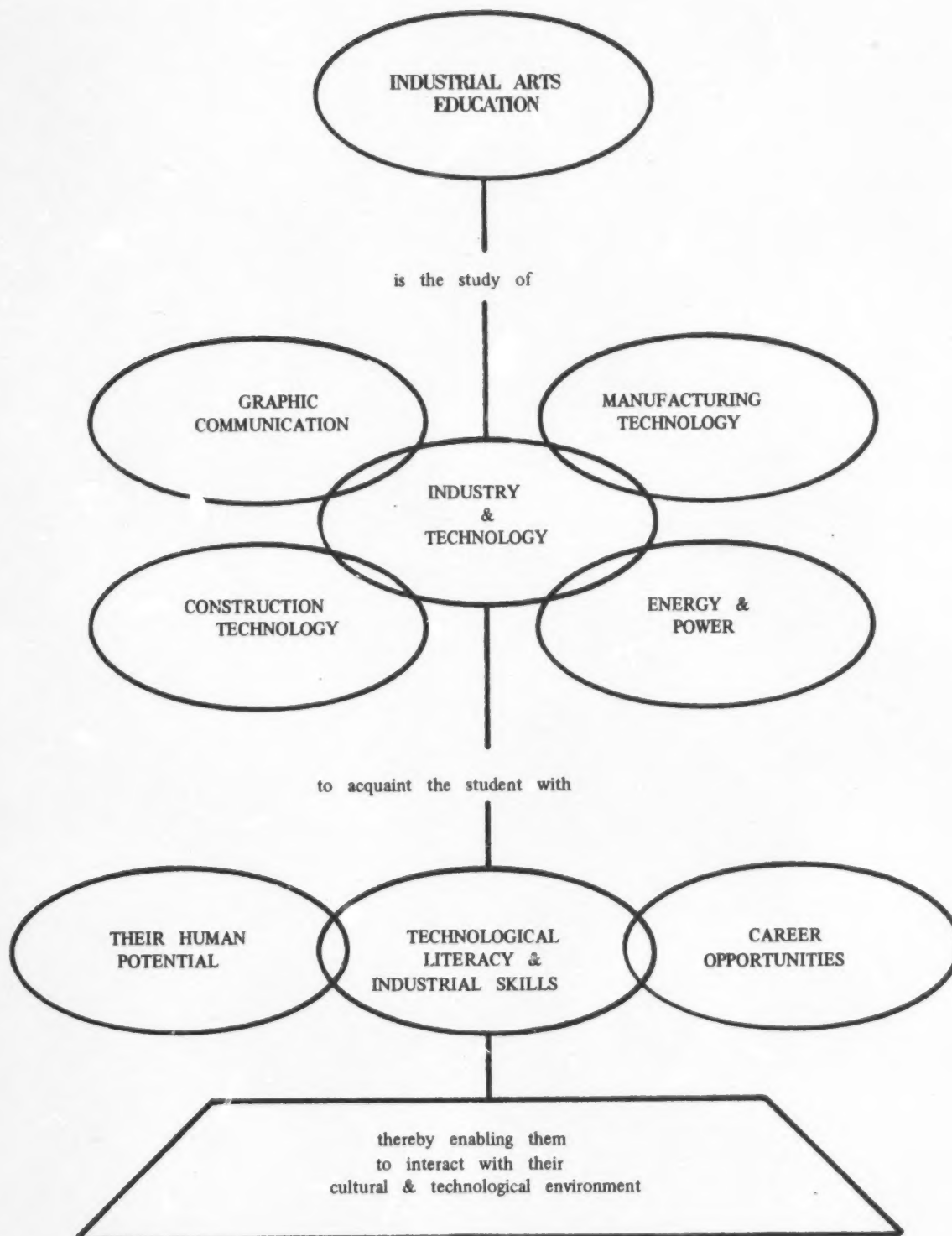


Figure 1

PROGRAM SCOPE AND SEQUENCE

Industrial arts education involves the preparation, growth, and guidance of the individual student for modern living through an instructional program including the technical, consumer, occupational, recreational, organization, social, historical and cultural aspects of industry and technology. The industrial arts program provides opportunities for students in elementary and secondary education to develop an understanding of industrial-technical knowledge through creative and problem-solving learning experiences.

The purpose of this guide is to assist the industrial arts teacher in the development of planned programs and courses that reflects the changing philosophy and practices in industrial arts education as well as incorporating the effects of technological changes. It is hoped that industrial arts teachers will use this guide as a basis for planning level one exploratory courses that reflect concepts related to industry and technology.

The guide provides a broad framework from which individual industrial arts programs and courses are developed at the local level. The learning experiences identified involve activities in experimenting, planning, designing, constructing, evaluating, and using tools, machines, materials, and processes. While industrial arts utilizes and motivates universal learning experiences, its scope and sequence of courses have a direct relationship to vocational education as well as career education concepts. The instructional and laboratory experiences provide students with knowledge to help them to make wise educational occupational choices.

Scope of Industrial Arts Programs--To understand the direction of industrial arts, while recognizing the interrelations of the programs, it becomes necessary to divide the total program into operational levels--the elementary, junior high (exploratory-level one) and high school (specialization-level two). (See figure 2).

Elementary School Industrial Arts Program

The focus of the program is to develop an awareness of our industrial-technical society. It assists youth in living and participating in a technological society by providing an introduction to the world of work. The instruction should concern itself with the many kinds of work that people do, and the interrelationship of such works to the production and consumption of goods and services.

The elementary school industrial arts program serves: (a) to support and enrich the general educational experiences and make it more meaningful

to youth; (b) to develop an awareness of the role of industry in a technological society; (c) to develop awareness of industrial related careers and their role in society; (d) to develop attitudes of cooperation and self-reliance through problem solving situations; and (e) to develop basic skills in working with hand tools and basic materials.

Junior High School--Level One--Program

The primary focus is to meet the needs of the early adolescent student. Early adolescence is a critical time in human development. During this time the student is seeking independence, sensitive to peer acceptance, establishing a value system and expanding his intellectual ability and experiences.

This operational level is divided into two parts: (1) Orientation; and (2) Exploration. The first course recommended is an orientation to industry and technology. Emphasis is placed on the "whole" of industry and technology and its effects on man, society and the environment. This course serves as the foundation to illustrate the complexity of industry and the interrelationships of its various elements in regards to types of industries, the organization and operation of industry.

The exploratory cluster courses include: (1) graphic communication; (2) manufacturing; (3) construction; and (4) energy and power. Special concerns for the exploratory cluster courses are the common learnings needed by all persons to function effectively in an industrial-technological society.

This phase is activity oriented through planned learning experiences in each of the four technical cluster areas. The activities assist the learner in developing proper attitudes, abilities and skills, problem solving, and understanding the world of work.

As a result of the sequence of industrial arts experiences at the junior high school or operational level one, the learner: exhibits a degree of industrial/technological literacy--insights and knowledge--in being able to relate societal and industrial changes to technology and its development; has made tentative choices or selection regarding educational and occupational goals; can identify and compare industrial and technical occupations, the organization of industry, evolving technologies, and methods of production; demonstrates the proper use of tools and materials; can apply, demonstrate and exhibit industrial processes and techniques through laboratory experiences and projects.

Senior High School--Level Two--Program

Industrial arts at the senior high school provides concentrated and specialized technical courses. The key to the level two program lies in its flexibility. Students at this level evince a wide range of interests, abilities, and life goals. The industrial arts program must

provide separate courses or instruction within courses that will provide the option of exploring industrial areas based on student interest or need.

In these courses, not all students may study the same depth or type of content. Courses and content may be selected individually for those who may leave school before graduation, graduate, or enroll in secondary or post-secondary vocational programs.

NORTH DAKOTA INDUSTRIAL ARTS CURRICULUM

Program Scope and Sequence Model

ELEMENTARY LEVEL

(k-6)

Awareness

JUNIOR HIGH LEVEL

(7-9)

Career Orientation & Exploration

SENIOR HIGH LEVEL

(10-12)

Specialization

At the elementary level, learning experiences in industrial arts will be directed primarily toward the child's development of an awareness of industry/technology and the world of work. The concepts and activities will be integrated with the elementary curriculum to enrich and reinforce the common learning areas.

INSIGHTS INTO INDUSTRY & TECHNOLOGY
A broad overview of industry and technology. Learning experiences will be directed toward the student's exploration of the historical, present, and future potentials of industry and technology.

GRAPHIC COMMUNICATIONS

MANUFACTURING

CONSTRUCTION

ENERGY & POWER

DESIGN/DRAFTING
GRAPHIC ARTS
INDIVIDUAL TECHNICAL PROBLEMS

MATERIALS & PROCESSES
PLASTICS
WOODS
METALS
INDIVIDUAL TECHNICAL PROBLEMS

ELECTRICITY/ELECTRONICS
POWER & TRANSPORTATION
INDIVIDUAL TECHNICAL PROBLEMS

Figure 2

FORMAT AND USE OF GUIDE

This guide was developed for the junior high school or level one phase of industrial arts. It was designed to provide school district personnel and industrial arts instructors with a recommended curriculum structure for the exploratory level of industrial arts education. It should be complemented by local teachers with specific instructional materials, lesson plans, assignment sheets and other instructional resources to enhance the teaching/learning process.

The overall format of this level one industrial arts curriculum guide is divided into six parts:

1. Introduction to the level one curriculum.
2. Introductory course--Insights into Industry and Technology.
3. Graphic Communication.
4. Manufacturing.
5. Construction.
6. Energy/Power.

Part 1 is provided to assist teachers in establishing industrial arts programs. It provides the rationale and objectives of industrial arts education. The content may be used to establish a firm basis for the total program. The curriculum organization follows the school operational levels of elementary, junior high, and senior high school in order to more effectively meet the needs of these subgroups.

The parts 2 through 5 provide the guidelines for actual courses to be offered at the exploratory level only. Each part provides the basic foundation to develop a one semester course based on the cluster concept. The cluster approach is suggested at the exploratory level one because it provides for study of interrelated careers and technologies in the industrial segment of life.

A working description of the five clusters recommended for industrial arts are:

1. Insights Into Industry and Technology--a course that provides an overview of industry and technology. It serves as an integrator or unifier of industry and technology as a "whole" rather than fragmented parts. Emphasis is on the discipline of industrial technology in regards to the role of industry,

materials, personnel, production, processes, energy, management, distribution, and occupational information.

2. Graphic Communication--an area of study involving techniques and processes used to transmit ideas, knowledge, or information. Emphasis will be to provide exploratory laboratory and classroom activities in the areas of drafting and graphic arts.
3. Manufacturing--an area of study involving techniques and processes used to produce goods. It involves research, locating and securing materials, processing of materials into finished products that will be of value to society.
4. Construction--an area of study in the development and building of a product to be assembled on site. Emphasis will be on pre-construction, construction, and post-construction including the whole spectrum of construction technology from management through construction processes.
5. Energy/Power--an area of study through activity-oriented instruction on energy sources, conversion, transmission and control, and usage in industry, domestic, and transportation.

Format of Each Cluster Area

A uniform format was used for each of the cluster areas in terms of pagination and division of sections for ready reference. The first section identified by the color of paper and numerical pagination includes the following elements:

- Rationale
- Cluster Objectives
- Guidelines for Implementation
- Taxonometric Structure
- Body of Knowledge
- List of Major Units

Section two for each part identifies recommended instructional units. The number of units vary between parts but the format is the same for all five parts. Specific elements for each unit include:

- Title of Unit
- Unit Objective
- Unit Outline
- Selected Student Competencies and Sample Learning Activities
- Resources

Section three or appendices for each cluster part includes a variety of aids or suggested aids that an instructor may use to enhance the total cluster area.

LEARNING EXPERIENCES IN INDUSTRIAL ARTS WILL...

...Provide opportunities to identify aptitudes, abilities, and interests meaningful to CAREER SELECTION.

The student can identify and differentiate various occupations and professions associated with technology.

Student Activities:

- Mass Production
- Field Trips
- Role Playing
- Custom Production
- Personnel Organization
- Personal Assessment

...Promote TECHNOLOGICAL LITERACY in youth and adults.

The student demonstrates technical literacy, insight, and knowledge that are essential for living and functioning successfully in a rapidly advancing technological society.

Student Activities:

- Using tools and materials of industry
- Identifying processes required to produce constructed and manufactured products
- Recognizing and evaluating quality of design, materials, and workmanship
- Reading, researching, and reporting information in the technical literature

...Develop Techniques in PROBLEM SOLVING.

The student demonstrates his problem solving abilities through problem analysis, ideation, prototype development, testing, and technical reporting.

Student Activities:

- Technical reports
- Planning and constructing projects
- Individual and team activities
- Design problems
- Research and development
- Simulating industrial techniques and processes
- Brainstorming
- Prototype developing and testing

...Develop basic SKILL in the use of tools, machines, and materials.

The student can properly use and care for common tools and machines

Student Activities:

- Using hand and power tools and equipment
- Construction activities
- Custom production
- Mass production

...Develop attitudes, individual involvement, and a realistic evaluation for CONSUMER AWARENESS

The student evaluates industrial products by judging the quality of construction, the selection of materials, and the fulfillment of function.

Student Activities:

- Product evaluation
- Testing limits of materials
- Research including design and drawing
- Understanding advertising
- Applying and evaluating finishes
- Fabricating and assembling products
- Exploring industrial processes

...Provide opportunities for PERSONAL and SOCIAL GROWTH.

The student exhibits cooperation, consideration, and understanding toward others, and pride for his/her own work.

Student Activities:

- Mass production
- Club activities
- Amateur radio
- Personnel organization
- Civic activities

...Provide opportunities for REINFORCEMENT of learning in other subject areas.

The student solves practical problems by the application of academic concepts and principles.

Student Activities:

- Research information and planning
- Performing experiments
- Using related instructional materials
- Developing related organization practices

Reading, writing, measuring, computing, and discussing
during technical applications

...Develop SAFETY habits.

The student exhibits safe practices in the laboratory and relates these
to situations in the school, home, and community.

Student Activities:

- Laboratory safety program
- Safety committees
- Self-evaluation
- Safety practices

...Contribute to improve RECREATION

The student, through laboratory experiences with tools and materials,
makes choices of activities for recreational purposes.

Student Activities:

- Crafts
- Metalworking
- Photography
- Mechanics
- Plastics
- Electronics

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